

STUDIES IN ANTARCTIC LICHENS 6: FURTHER NOTES ON UMBILICARIA

by

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ABSTRACT

Filson, Rex B. Studies in Antarctic lichens 6: further notes on *Umbilicaria*. *Muelleria* 6(5): 335-347 (1987). — Five species of *Umbilicaria* are enumerated for Continental Antarctica, South Shetland Islands, South Orkney Islands and the off-shore islands of the Antarctic continent (Fig. 1): *U. aprina* Nyl., *U. cristata* Dodge & Baker, *U. decussata* (Vill.) Zahlbr., *U. propagulifera* (Vainio) Llano and *U. rufidula* Hue. A key to species is given and a full description and distribution map of each species is provided. *U. antarctica* Frey & Lamb and *U. dillenii* Tuck. var. *solida* Frey are placed in synonymy under *U. rufidula* Hue; *U. saviczii* Llano and *Gyrophora korotkeviczii* Golubkova are placed in synonymy under *U. aprina* and *Dermatiscum mawsoni* Dodge is placed in synonymy under *U. decussata*. The validity of all other taxa within the Umbilicariaceae described from the region is discussed.

INTRODUCTION

This paper is a continuation of a series of papers on the lichens of Antarctica (Filson 1974a,b; Filson 1975 a,b,c).

In a paper enumerating the lichens collected on the Windmill Islands, Wilkes Land, (Filson 1974b) I accepted two species of *Umbilicaria*; *U. cristata* Dodge & Baker, a species with a few tufts of rhizines on the lower surface, and *U. decussata* (Vill.) Zahlbr., a species without rhizines below. In a further paper (Filson 1975b) I discussed the possibility of two rhizinate species being present on the Antarctic Continent, one, *U. antarctica* Frey & Lamb, occurring along the Antarctic Peninsula region in western Antarctica and the other, *U. aprina* Nyl., occurring in eastern Antarctica. Since writing those papers I have had the opportunity of examining all of the *Umbilicaria* collection from Antarctica housed in the British Museum (Natural History) together with several other modern collections (see acknowledgements). I now consider that there are five species of *Umbilicaria* in the area under discussion and have found that nomenclatural changes are required.

BRIEF SUMMARY OF PREVIOUS WORK

In the 'Lichen Flora of the Antarctic Continent and Adjacent Islands', Dodge (1973) divided the Umbilicariaceae into five genera, *Agyrophora*, *Omphalodiscus*, *Llanoa*, *Umbilicaria* and *Dermatiscum*. Within these five genera he recognised the following fifteen taxa — *Agyrophora nana* (Vainio) Dodge, *Omphalodiscus antarctica* (Frey & Lamb) Llano, *O. bakeri* Dodge, [nom. superfl.], *O. eximius* (Hue) Dodge, *O. spongiosus* (Dodge & Baker) Llano, *O. spongiosus* var. *subvirginus* (Frey & Lamb) Dodge, *O. subcerebriformis* (Dodge) Dodge, *Llanoa cerebriformis* (Dodge & Baker) Dodge, *Umbilicaria cristata* Dodge & Baker, *U. hunteri* Dodge, *U. parvula* Hue, *U. pateriformis* Dodge & Baker, *U. propagulifera* (Vainio) Llano [wrongly cited (Räs.) Llano], *Dermatiscum harrisonii* Dodge, and *D. mawsonii* Dodge.

In his account Dodge placed *U. dillenii* Vainio, *U. rufidula* Hue and *U. dillenii* var. *solida* Frey within the taxon *Omphalodiscus antarcticus*. He proposed *O. bakeri* as a new name for *Umbilicaria rugosa* Dodge & Baker, which he reported as a later homonym of *Gyrophora rugosa* Hook. However, I cannot find where the

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epithet *rugosa* has been used in combination with *Omphalodiscus* and therefore *O. bakeri* is nomenclaturally superfluous and illegitimate (ICBN, Art. 63).

Llano (1950) listed seven taxa of Umbilicariaceae as occurring in Antarctica, namely *Omphalodiscus antarcticus* (Frey & Lamb) [as 'Lamb & Frey'] Llano, *O. antarcticus* var. *cerebriformis* (Dodge & Baker) Llano, *O. spongiosus* (Dodge & Baker) Llano, *Umbilicaria cristata* Dodge & Baker, *U. propagulifera* (Vain.) Räs. Llano, *U. solida* (Frey) Llano and *Agyrophora leiocarpa* var. *nana* (Vain.) Llano. In this paper he placed *Umbilicaria antarctica* var. *subvirginis* in synonymy with *Omphalodiscus spongiosus*, *U. rufidula* with *O. antarcticus*, and *U. eximia*, *U. rugosa*, *U. hunteri* and *U. pateriformis* with *O. decussatus*.

Lindsay (1969) enumerated five species of *Umbilicaria* for the Peninsula region of Antarctica (Fig. 1.), these being *Omphalodiscus antarcticus* (Frey & Lamb) Llano, *O. decussatus* (Vill.) Schol., *O. spongiosus* (Dodge & Baker) Llano, *Umbilicaria propagulifera* (Vain.) Llano and *U. cristata* Dodge & Baker. In a later paper (Lindsay 1972) he cited two species from Vestfjella, *U. aprina* Nyl. and *U. decussata*, with the note that *U. aprina* appeared very similar to *U. spongiosa*.

Øvstedal (1983, a & b, 1986) also reported *U. aprina* and *U. decussata* from the mountains of Dronning Maud Land (Fig. 1).

Seppelt (1986) recorded the same two species from the Vestfold Hills, Princess Elizabeth Land (Fig. 1). He placed *U. dillenii* Vain., *U. dillenii* var. *solida* Frey, *U. rufidula* Hue, *Charcotia rufidula* Hue, *U. solida* Llano, *U. antarctica* Frey & Lamb, *U. antarctica* var. *subvirginis* Frey & Lamb, *Omphalodiscus antarcticus* (Frey & Lamb) Llano, *O. spongiosus* (Dodge & Baker) Llano, *O. spongiosus* var. *subvirginis* (Frey & Lamb) Dodge, *U. spongiosa* Dodge & Baker, *U. spongiosa* var. *subvirginis* (Frey & Lamb) Dodge, ?*O. bakeri* Dodge and ?*U. rugosa* Dodge & Baker in synonymy with *U. aprina*.

Poelt (1974) has suggested that the genus *Dermaticum* be placed in a family of its own the Dermaticaceae, as its affinities lie with the Physciaceae rather than the Umbilicariaceae. The species *Dermaticum harissoni* Dodge was described (Dodge 1948) from a "single fragmented collection, separated from other lichens, on dead mosses. It is evidently old and weathered, which may account for the browning of the medullary tissue. The species is somewhat aberrant in the genus in being attached to the substrate by abundant single brown hyphae, rather than by a central hapteron and by much slenderer hyphae throughout the thallus but its algae are clearly Trentepohlioid . . .". Unfortunately the single fragmentary collection A.A.E. 56-1 could not be located so it is impossible to know where this specimen should be placed. However from the description provided it is evident that the material does not belong in the Umbilicariaceae.

Additional comments on the above taxa are included in the discussions under the relevant species.

TAXONOMIC CRITERIA AND ASSESSMENT OF SPECIMENS

The above brief summary shows that most authors have divided this family into a number of genera. However generic divisions within the Umbilicariaceae based on apothecium morphology alone leads to unnatural groupings and the maintenance of one single genus is supported by ontogenetical studies (Henssen 1970). The presence of "Brutkörner" or "thallospores" are considered as being conidia of the mycobiont and are characteristic of species (Hassenhüttl and Poelt 1978).

Selected specimens from each of the four species were examined by thin layer chromatography which proved to be of little use in the separation of species.

Fertile specimens are very rare in Antarctica. The only fertile specimens which I have seen, have been collected in the Peninsula region in eastern Antarctica and in the Antarctic Islands just to the north. It would appear that these are the only regions where climatic conditions are suitable for a thallus to produce fruiting bodies.

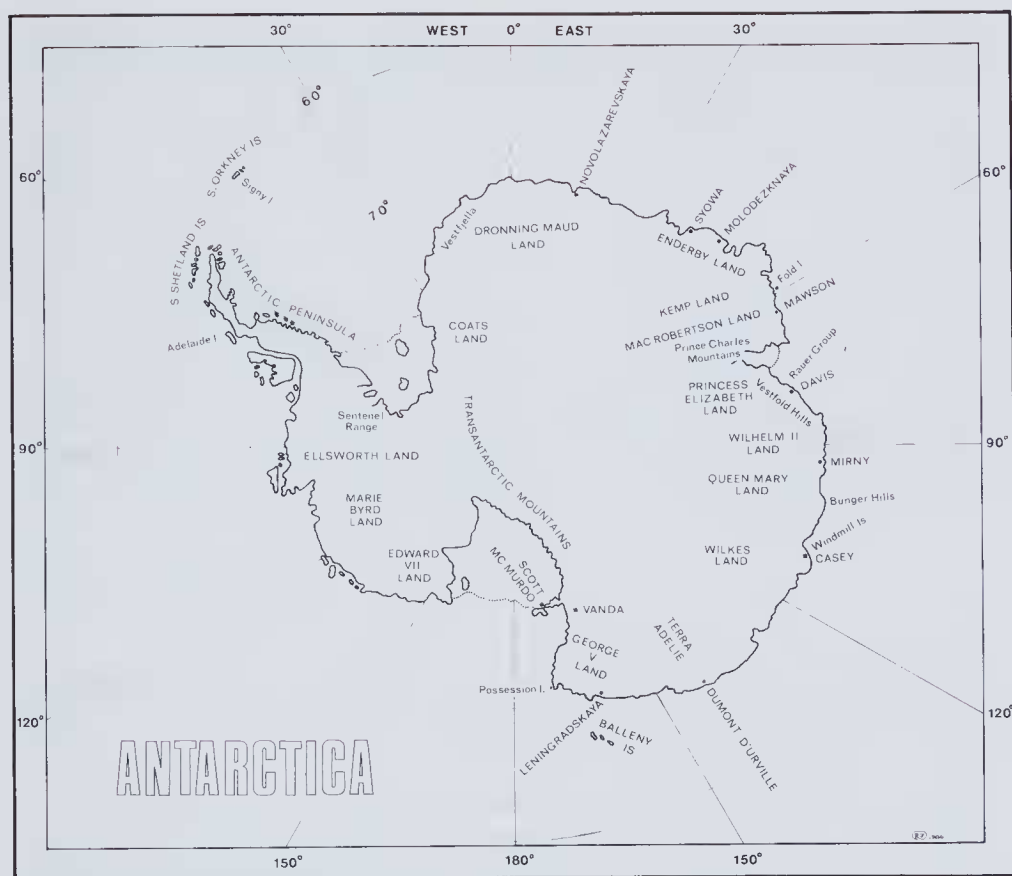


Fig. 1. Map of Antarctica showing localities referred to in the text and reference points for the distribution maps (see Fig. 3.).

I have examined over 350 complete specimens, mostly still attached to the substrate. In addition, there are many packets of fragments in herbaria, with a multitude of names. I have assigned them by virtue of their undersurface, or nature of the rhizines, to the species named in this paper. None appear to me to have any special characters which would warrant their segregation as distinct species.

A complete list of specimens examined is available from the National Herbarium of Victoria (MEL).

TAXONOMY

KEY TO SPECIES OF UMBILICARIA IN THE ANTARCTIC

1. Undersurface with rhizines
 2. Rhizines dense, sometimes with a bare patch around the umbilicus, simple, dichotomous or strap-like
 3. Upper surface smooth to lightly ridged; margins sometimes rolled under, never subvertical, ragged and torn; underside black; thallospores always thick and conspicuous *U. rufidula*
 3. Upper surface granulose, wrinkled to deeply ridged; margins flexuose, often subvertical; underside pale pinkish-brown to sooty-brown to black; thallospores often inconspicuous, but sometimes thick and conspicuous *U. aprina*
 2. Rhizines sparse, sometimes only marginal, simple to much branched
 4. Rhizines irregularly branched many times; thallospores thick and conspicuous *U. propagulifera*
 4. Rhizines simple or several times dichotomously branched; thallospores sparse and inconspicuous *U. cristata*
1. Undersurface erhizinate *U. decussata*

Umbilicaria aprina Nyl., Synops. Lich. 2: 12 (1863). TYPE: "In monte Dedschen Abyssiniae lecta a cl. W. Shimper, altitudine 14200 pedum supra mare." HOLOTYPE: "Abyssinia, Dedschen altit. 14200 pedum. W. Schimper." (H-NYL 31742!).

Umbilicaria spongiosa Dodge & Baker, Ann. Mo. bot. Gnd. 25: 566 (1938). — *Omphalodiscus spongiosus* (Dodge & Baker) Llano, Monogr. Umbil.: 91 (1950). — *Gyrophora spongiosa* (Dodge & Baker) Golubkova & Savicz, Nov. Syst. Vysshikh. Rast. 3: 259 (1966). TYPE: "Marie Byrd Land, Edsel Ford Range, Lichen Peak, P. Siple & S. Corey 73-9. HOLOTYPE: "Marie Byrd Land Lichen Peak Siple & Corey 73-9." (Herb. Dodge!).

Umbilicaria antarctica var. *subvirginis* Frey & Lamb, Trans. Br. Mycol. Soc. 22: 272 (1939). — *Umbilicaria spongiosa* var. *subvirginis* (Frey & Lamb) Dodge, B.A.N.Z. Antarct. Exped. 1929-31 Rep. Ser., B. Zool.-Bot. 7: 148 (1948). — *Gyrophora spongiosa* var. *subvirginis* (Frey & Lamb) [as "Lamb & Frey"] Golubkova & Savicz, Nov. Syst. Vysshikh. Rast. 3: 260 (1966). — *Omphalodiscus spongiosus* var. *subvirginis* (Frey & Lamb) Dodge, Antarct. Lich.: 124 (1973). TYPE: "Regio antarctica: South Victoria Land, Cape Sastrugi, Evans Cove, leg. British Antarctic Expedition Terra Nova, 1910." HOLOTYPE: "Cape Sastrugi Evans Cove det. O.V. Darbshire." (BM!).

Umbilicaria saviczii Llano, Bryologist 69: 110 (1966). TYPE: "Antarctica. Princess Astrid Coast. Novolazarevskaya, 70° 46'S, 11° 50'E, Meyer 6." (Llano, p.111 says "US — holotype" however a search at that herbarium (Hale, pers. comm.) and at ABSL (Wetmore, pers. comm.), where the major part of the Llano herbarium has been deposited, has failed to locate the type specimen).

Gyrophora korotkeviczii Golubkova, Nov. Syst. Vysshikh. Rast. 3: 261 (1966). TYPE: "Antarctida Orientalis, Litus Pravda, Bunger Hills ad saxa 3 III 1957; E.S. Korotkevicz." HOLOTYPE: "Antarctida Orientalis, litus Pravda, Bunger Hills, ad saxa. E.S. Korotkevicz 523. 3.III. 1957." (LE!).

Thallus foliose, thick, leathery, monophyllous, deeply incised, often appearing polyphyllous, very variable in size and shape from small rosulate thalli, less than 1 cm diam., to large foliose thalli to 10 cm diam.; margins flexuose, often subvertical, at times bordered with a white necrotic zone; sometimes several thalli growing together in tightly compressed colonies; upper surface light buff to mummy-brown, grey to almost black, dull, pruinose or sometimes covered with a thick necrotic layer, granulose, indistinctly cracked, wrinkled to reticulately rugose and often paler above the umbo, fading to the margins; lower surface pale pinkish-brown to sooty-brown to black; thallospores farinose, inconspicuous on paler thalli but thick and conspicuous on those with a black undersurface; rhizines moderate to dense, thinning to a narrow bare zone around the umbilicus, simple to sparingly branched, occasionally fasciculate, cylindrical to strap-like, variously coloured, mostly lighter than the undersurface of the thallus, sometimes grading from dark at the base to light at the tips, rarely evenly dark coloured; thallospores thick on darker rhizines absent on lighter. *Apothecia* not seen.

DISTRIBUTION: Fig. 3a.

DISCUSSION:

Lindsay (1972) first reported the presence of this species on the Antarctic continent. He suggested that it appeared similar to *Umbilicaria spongiosa* Dodge & Baker, an observation confirmed by Filson (1975b).

I have discussed the type specimen of *Umbilicaria spongiosa* and *U. antarctica* var. *subvirginis* elsewhere (Filson 1975b).

The holotype specimen of *Gyrophora korotkeviczii* consists of two complete thalli and three thalline fragments. The thalli are small, to 20 mm diam.; upper surface smooth, pale buff; lower surface pale pinkish-brown at the margins, becoming sooty-brown towards the centre; rhizines concolourous to paler than the lower surface, sparingly branched. In all respects they agree with the typical "young,

smooth thallus form" of *U. aprina*. These specimens were possibly growing in a sheltered site.

In the protologue, *U. saviczii* is said to differ from the "virginis — crustulosus — spodochrous complex" by the "parti-coloured lower surface and the highly branched rhizines". Species of this complex were not reported from the Antarctic (Llano 1950), however the description of *U. saviczii* agrees well with specimens of *U. aprina* found on Continental Antarctica.

Umbilicaria cristata Dodge & Baker, Ann. Mo. bot. Gdn. 25: 565 (1938). TYPE: "King Edward VII Land, Rockefeller Mts., Mt. Helen Washington, P. Siple, F.A. Wade, S. Corey & O.D. Stancliff HW-1a." HOLOTYPE: (n.v.).

Thallus foliose, monophyllous, to 10 mm diam.; margins smooth, flexuose, crenate, incised, bare or thickly beset with rhizines; upper surface dull, grey-brown, smooth, rugulose and occasionally pruinose over the umbilicus; lower surface dirty white to pinkish-brown, thinly covered with thallospores; thallospores thicker in the marginal rhizinate zone; rhizines black, mostly well developed, to 2 mm long, simple to many times dichotomously branched, bare or thinly covered with thallospores. *Apothecia* and *pycnidia* not seen.

DISTRIBUTION: Fig. 3b.

DISCUSSION:

Umbilicaria cristata is a very small species characterised by the long, dichotomously branched, marginal rhizines. Unfortunately I have not been able to borrow the type. However, there is a specimen in the National Herbarium of Victoria determined by Dodge and cited in his BANZARE report (Dodge 1948) as *U. cristata* (A.A.E. 60-2). This specimen consists of several fragments of more than one thallus with branched rhizines and one almost complete erhizinate thallus. The latter can be referred to *U. decussata*. Llano (1950) keys out the "Antarctic species" of *Umbilicaria* separately from the others in the Western Hemisphere but does not give any clear distinction between *U. cristata* and *U. propagulifera*. He stated: "This species [*U. cristata*] has been recorded from two widely separated localities in the Antarctic; it may well be circumpolar. It is quite distinct, morphologically from *U. propagulifera* Vain. but both of these species are known only sterile. Both appear to be somewhat similar to *U. cylindrica* but there is no proof that they may be referable to that species."

Under *U. propagulifera* Llano wrote that "Sterile Umbilicariaceae with rhizinate margins are usually coniferable to *U. cylindrica* as Vainio apparently did with this material [*Gyrophora cylindrica* var. *propagulifera*]. However, when compared with the many varieties of *U. cylindrica*, it may be seen that Vainio's variety exhibits strong dissimilarities.". Again Llano does not say what dissimilarities, nor does he give any further discussion or reasons why he considers them to be distinct species.

I have examined additional material from "summit 706 m" east of Swinhoe Peak, South Georgia. These specimens clearly illustrate the difference between the rhizines and thallospores of this species and *U. propagulifera*.

Umbilicaria decussata (Vill.) Zahlbr., Cat. Lich. Univ. 8: 490 (1942). — *Lichen decussatus* Vill., Hist. Plant. Dauphiné 3: 964 (1789). — *Omphalodiscus decussatus* (Vill.) Schol., Nytt Mag. Naturvid. 75: 23 (1934). TYPE: "Il croit sur les rochers granitiques des hautes Alpes, du Valgaudemar, de Champoleon, de Chaillol-le-Vieux, &c.". HOLOTYPE: Villars 1789, Hist. Plant Dauphine pl. LV.

Umbilicaria eximia Hue, Deux. Expéd. Antarct. Franç. 1908-10, Sci. nat., doc. sci.: 55 (1915). — *Omphalodiscus eximius* (Hue) Dodge, Antarct. Lich.: 122 (1973). TYPE: "Ile Jenny, baie Marguerite, sur les pierres des éboulis, très abondant, XIIe

excursion, no 226 altitude 380 mètres, et no 227, altitude 75 mètres, no 228, le 15 janvier 1909.”. LECTOTYPE (here chosen): “2° expéd. antarct. française 1908-1910 no 227 pour partie.” (PC!).

Umbilicaria parvula Hue, Deux. Expéd. Antarct. Franç. 1908-10, Sci. nat., doc. sci.: 56 (1915). — *Gyrophora parvula* (Hue) Zahlbr., Cat. Lich. Univ. 4: 720 (1927). TYPE: Petite île dans la baie Marguerite, sur les rochers (diorites), XVe excursion, no 267, 24 janvier 1909.”. LECTOTYPE (here chosen): “2° expéd. Antarct Française 1908-10 no 267 pr. partie.” (PC!).

Umbilicaria rugosa Dodge & Baker, Ann. Mo. bot. Gdn. 25: 561 (1938), non J.D. Hook. in Kunth., Syn. Pl. Aequinoct. Orb. Nov. 1: 16 (1822). — *Omphalodiscus bakeri* Dodge, Antarct. Lich.: 120 (1973). TYPE: “King Edward VII Land, Rockefeller Mts., Mt. Helen Washington, P. Siple, F.A. Wade, S. Corey & O.D. Stancliff HW-12.”. HOLOTYPE: (n.v.).

Umbilicaria cerebriformis Dodge & Baker, Ann. Mo. bot. Gdn. 25: 562 (1938). — *Charcotia cerebriformis* (Dodge & Baker) Dodge, B.A.N.Z. Antarct. Res. Exped. 1929-31 Rep. Ser., B. Zool.-Bot. 7: 150 (1948). — *Omphalodiscus decussatus* var. *cebriformis* (Dodge & Baker) Llano, Monogr. Umbil.: 83 (1950). — *Llanoa cerebriformis* (Dodge & Baker) Dodge, Antarct. Lich.: 127 (1973). TYPE: “Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, P. Siple & S. Corey 72W-15.”. HOLOTYPE: (n.v.).

Umbilicaria pateriformis Dodge & Baker, Ann. Mo. bot. Gdn. 25: 564 (1938). TYPE: “Marie Byrd Land, Edsel Ford Range, Skua Gull Mt., P. Siple & S. Corey 72W-13.”. HOLOTYPE: (n.v.).

Umbilicaria hunteri Dodge, B.A.N.Z. Antarct. Res. Exped. 1929-31, Rep. Ser., B. Zool.-Bot. 7: 148 (1948). TYPE: “King George V Land, Cape Denison, J.G. Hunter 21, A.A.E. 21.”. HOLOTYPE: (n.v.).

Umbilicaria subcebriformis Dodge, B.A.N.Z. Antarct. Res. Exped. 1929-31 Rep. Ser., B. Zool.-Bot. 7: 149 (1948). — *Omphalodiscus subcebriformis* (Dodge) Dodge, Bull. Jard. bot. Etat. Brux. 32: 302 (1962). TYPE: “George V Land, Cape Denison, J.G. Hunter, A.A.E. 70.”. HOLOTYPE: (n.v.).

Omphalodiscus decussatus var. *tortuosus* Llano, J. Wash. Acad. Sci. 46: 185 (1956). TYPE: “Antarctica: MacRobertson Land, A.N.A.R.E. Base Mawson (lat. 67° 36' 21" S., long 62° 52' 48" E.). Leg. R.O. Summers, January 1955.”. HOLOTYPE: (n.v.) (Llano p.185, does not state where the holotype material of this species has been lodged. A search of US (Hale, pers. comm.) and ABSL (Wetmore, pers. comm.) has failed to locate any type material, nor is there any specimen by this name amongst those collected by R.O. Summers held in MEL).

Umbilicaria leiocarpa var. *nana* Vainio, Exped. Antarct. Belge Res. voy. S.Y. Belgica Rap. Sci. Bot.: 9 (1903). — *Agyrophora leiocarpa* var. *nana* (Vainio) Llano, Monogr. Umbil.: 56 (1950). TYPE: “Déroit de Gerlache: sur un rocher isolé au milieu d'un glacier, à 300 m. d'altitude au-dessus du niveau de la mer, à l'île Brabant, 64° 21' de latitude sud (10e débarquement, n. 250).” LECTOTYPE (here chosen): “Exped. Antarct. Belge 1898 250. Herb. Vainio 200 (Tur! 00554). ISOLECTOTYPE: “Expd Antart Belge 1897-99 no 250.” (BR!).

Dermatiscum mawsoni Dodge, B.A.N.Z. Antarct. Exped. 1929-31 Rep. Ser., B. Zool.-Bot. 7: 152 (1948). TYPE: “King George V Land, Cape Denison, B.A.N.Z.A.R.E. 536.”. LECTOTYPE (here chosen): “King George V Land (Antarctica) On rocks, Cape Denison, Commonwealth Bay 67° 00' S, 142° 36' E, 536-16. January 5, 6, 1931.” (AD 12682!).

Thallus foliose, monophyllous, sometimes several thalli grow together giving the appearance of being polyphyllous, variable in size, (5-)c.15(-50) mm diam; margins smooth, sometimes lacinate, varying in colour from light grey-olive, brown, grey to almost black; upper surface dull, areolate, pruinose, smooth to rugulose and deeply folded; rugi elevated into a fine reticulate pattern or broadly compressed into strongly formed ridges; lower surface dull, varying from pale pinkish-buff to brown to sooty-black, sometimes a mottling of several shades; erhizinate. *Apothecia*

rare, laminal, mostly towards the margins of the thallus, to 0.8 mm diam., sessile or shortly stipitate, constricted below, marginate; margins prominent, smooth to crenulate; disk black, gyrose sometimes fissured in the centre; hymenium to 50 μm tall, pale brown; subhymenium* brown; hypothecium dark brown; asci 30-33 x 12-16 μm *ascospores* 8 per ascus, simple, hyaline, ellipsoid, 8-9 x 5-6 μm .

DISTRIBUTION: Fig. 3c.

DISCUSSION:

Umbilicaria decussata is a ubiquitous lichen. Its variable thallus has given reason to many authors for erecting new taxa. The antarctic environment has provided the most diversity with seven segregates from *U. decussata* being described as new. Dodge (1973) cites these seven as present in Antarctica but does not accept that *U. decussata* occurs there. This species is very common in Australia where numerous forms, including many of these segregates, may occur on a single rock. I find it impossible to accept that there is any difference between the specimens growing in Australia and those in Antarctica.

Unfortunately the type specimens of *Umbilicaria rugosa*, *U. cerebriformis*, *U. pateriformis*, *U. hunteri* and *U. subcerebriformis* have not been available for study. However three of these names are represented in the National Herbarium of Victoria by specimens which have been determined by Dodge and are cited in his BANZARE report (Dodge 1948). They are:

1. *Umbilicaria hunteri* Dodge (Hunter 11-2). In discussing this specimen Dodge (1948: 148) says "Hunter 11-2 seems to be a young thallus of this species, the cortices being much thinner than the measurements given above, the thallus is smooth, tawny olive when moist and the medulla has the same structure as the other specimens cited." This specimen consists of a single, small, pale brown thallus. It is consistent with similar smooth pale brown thalli which are considered to be underdeveloped forms of *U. decussata* growing in sheltered habitats. I have observed these forms in the Australian alps and in north Greenland and I can see no reason to separate them from *U. decussata*.

2. *Umbilicaria cerebriformis* Dodge & Baker (A.A.E. 28-1). This specimen, determined as *Charcotia cerebriformis* (Dodge & Baker) Dodge and so cited in the BANZARE report, consists of fragments of several small, rugulose thalli. No apothecia of *Scutula* were present on any of the fragments, but there is one small developing apothecium which has the appearance of a young apothecium of *U. decussata*.

3. *Umbilicaria subcerebriformis* Dodge (A.A.E. 104-2). This specimen consists of fragments of several small thalli. They are mainly pale whitish-brown to brown fragments which are consistent with *U. decussata* growing under adverse conditions.

Umbilicaria rugosa Dodge & Baker and *U. pateriformis* Dodge & Baker are separated from *U. decussata* in the key given by Dodge & Baker (1938) by the colour of the upper surface. Although I have not seen specimens of *U. rugosa* and *U. pateriformis*, I do not consider that surface colour is a valid criterion on which to differentiate species. From my own observations, colour varies according to the habitat and degree of exposure.

The type of *Dermatiscum mawsoni* Dodge is cited as "King George V Land, Cape Denison, B.A.N.Z.A.R.E. 536." and at the end of the protologue Dodge says "On rocks with *Umbilicaria rugosa* and *Lecanora exsulans*. King George V Land, Cape Denison, B.A.N.Z.A.R.E. 536-16, 536-17, 536-19." The collection number 536 occurs throughout the B.A.N.Z.A.R.E. report with other sub-numbers representing other species so it appears that this number alone cannot represent

* terminology according to Frey 1936, Fig. 1.

the holotype collection. Only one collection, 536-16, is represented in the B.A.N.Z.A.R.E. collection at the State Herbarium of South Australia (AD). It is annotated by Dodge "*Dermatiscum Mawsoni*, *Umbilicaria rugosa*, *Lecanora exsulans*." So it seems pertinent to select the lectotype from this collection. Unfortunately the enclosed thalli are crushed to fragments — all of which appear to be *U. decussata*. I examined several of the larger fragments but could not detect the alga *Trentepohlia* or any filamentous algal threads in them. There are one or two almost complete thalli 7-8 mm diameter which resemble the protologue of *D. mawsoni* which I have selected as lectotype.

Øvstedal (1983a) examined the lower surface of the type material of *Umbilicaria leiocarpa* var. *nana* by Scanning Electron Microscope. He concluded that it was not possible to distinguish between the sample which he examined and young specimens of *U. decussata*.

One specimen collected on "Operation Tabarin No. 2505" at Scar Hills, Hope Bay, Trinity Peninsula, East Graham Land, on 25.ix.1945 by I.M. Lamb, is unusually rugose on the upper surface. This specimen is sterile and has the appearance of *U. hyperborea* (Ach.) Hoffm. Lamb in his notes on the specimen says "This unusually rugose form was seen only in this one place." In the absence of more material I prefer to include it as a rugose form of *U. decussata* rather than include it as the only collection of *U. hyperborea* from the Antarctic Continent.

Umbilicaria propagulifera (Vainio) Llano, Monogr. Umbil.: 162 (1950). *Gyrophora cylindrica* f. *propagulifera* Vainio, Exped. Antarct. Belge Res. voy. S.Y. Belgica Rap. Sci. Bot.: 10 (1903). — *Gyrophora propagulifera* (Vainio) Räsänen, Rev. Univ. Santiago 23: 195 (1937). TYPE: "Détroit de Gerlache: sur un rocher isolé au milieu d'un glacier, à 300 m. d'altitude au-dessus du niveau de la mer, 64° 21' de latitude sud, Ile Brabant (10e débarquement, n. 248 pr.p., 154)." LECTOTYPE (here chosen): "Exped Antarct Belge 1897-99 No. 154." (BR!). ISOLECTOTYPE: "Détroit de Gerlache: sur un rocher isolé au milieu d'un glacier, à 300m. d'altitude au-dessus du niveau de la mer, 64° 21' de latitude sud, Ile Brabant (10e débarquement, n. 154). 1898 M. Emile G. Racovitza. (TUR 000597!). REMAINING SYNTYPE: "Exped Antarct Belge 1897-99 no. 248 pp. (BR!).

Thallus foliose, polyphyllous, rarely monophyllous, to 5(-10) cm diam., often several thalli grow together to form rosettes; margins smooth, flexuose, crenate to incised, thickly beset with branched rhizines; upper surface dull, pruinose, grey-brown to grey to almost black, usually darker centrally shading to the margins, smooth, cracking with age, occasionally perforations develop along the cracks and rhizines grow through forming tufts on the upper surface, older specimens show some obscure reticulate ridging; lower surface pale pinkish-brown to dark brown, with a sparse to well-developed covering of rhizines; rhizines irregularly branched, rarely simple, dark brown to black, thickly covered with thallospores. *Apothecia* to 1 mm diam., at first plane, becoming gyrose, stipitate; *ascospores* not seen.

DISTRIBUTION: Fig. 3d.

DISCUSSION:

Umbilicaria propagulifera is common in eastern Antarctica and has been located at a few localities in the west. However it is an easily overlooked species and could have a wider range.

I have chosen the specimen in BR as lectotype merely because although small, it is larger than the isolectotype. Both specimens have obvious thallospores on the rhizines and lower surface.

I first considered this material should be referred to *U. cylindrica* a cosmopolitan species which is very common in alpine areas of Australia. However *U. propagulifera* has been shown (Topham *et al.* 1982, Seaward *et al.* 1983) to differ from *U. cylindrica* by the presence of thallospores on the lower surface and rhizines.

Only one fertile specimen has been seen in the collections from the Antarctic, "Dry habitat, north facing rock slopes, Galindez Island. 16. xii. 1935 British Graham Land "Penola" Expedition 1934-37" (BM). This specimen has two apothecia, one plane, very immature and the other showing a few gyri, however neither were sectioned. The external appearance of the apothecia resemble those found on *U. propagulifera* from Australia.

Umbilicaria rufidula (Hue) Filson, comb. nov. *Charcotia rufidula* Hue, Bull. Soc. bot. Fr. ser. 4, 15: 17 (1915). — *Umbilicaria rufidula* Hue, Deux. Expéd. Antarct. Franç. 1908-10, Sci. nat., doc. sci.: 52 (1915) nom. inval. — *Charcotia rufidula* Hue, Deux. Expéd. Antarct. Franç. 1908-10, Sci. nat., doc. sci.: 185 (1915) nom. inval. TYPE: "Sur les rochers, Ile Booth-Wandel, 10, 15 et 23 novembre 1904". LECTOTYPE (here chosen): "*U. Dillenii* Hue, Lich. in Exped. antarct. française 1903-1905, p.13." (PC!).

Umbilicaria antarctica Frey & Lamb, Trans. Br. mycol. Soc. 22: 270 (1939). — *Omphalodiscus antarcticus* (Frey & Lamb) Llano, Monogr. Umbil.: 76 (1950). — *Gyrophora antarctica* (Frey & Lamb) Golubkova & Savicz, Nov. Syst. Vysshikh. Rast. 3: 258 (1966). TYPE: "Regio antarctica: South Orkneys, Signy Island, leg. A.G. Bennett, 1915.". HOLOTYPE: "Antarctica: South Orkneys, Signy Island, leg. A.G. Bennett, 1915." (BM!).

Umbilicaria dillenii var. *solida* Frey, Bericht Sweiz. Bot. Ges. 45: 217 (1936). — *Umbilicaria solida* (Frey) Llano, Monogr. Umbil.: 196 (1950). TYPE: "Süd-Orkney Inseln, 60° 13' s. B. coll. Edgar Szumla 1904, F. Kurtz Herbarium argentinum Nr. 12. 935 in Herb. Berlin-Dahlen." LECTOTYPE (here chosen): "Süd-Orkney-Inseln 60° 43' S.B. 44° 47' W Grenwich. leg. Edgar Szumla 1904 — F. Kurtz. Herbarium argentinum no 12.935. ex Herb. Berlin." (BERN-Frey 6081!).

Thallus foliose, thick, brittle when dry, monophyllous, to 15 cm diam.; margins flexuose, sometimes revolute, lacerated and torn, sometimes appearing ragged; upper surface dull, pale creamy-buff to reddish-brown to brownish-grey, smooth, undulate to mildly wrinkled, sometimes with small perforations, through which rhizines project from the lower surface; lower surface black, thallospores thick and conspicuous; rhizines moderate to dense, thinning to a bare zone around the umbilicus (in old specimens the lower surface may be almost bare with only a zone of short stunted rhizines around the margins), simple or sparingly branched to strap-like; thallospores farinose, often thickly covering the whole rhizine but occasionally towards the tips they become bare, when dry the rhizines are mostly black but occasionally they are brownish-buff or buff with a ginger tinge. *Apothecia* rare, laminal, towards the margins of the upper surface, to 1.5 mm diam., sessile, constricted below sometimes with several rhizines emerging from the lower cortex; margin prominent, smooth to flexuose; disk black, smooth or with central sterile column; hymenium to 60 μm tall; subhymenium pale brown; hypothecium dark brown; asci 35-45 x 13-18 μm ; paraphyses septate, branched, only slightly expanded at the apices; *ascospores* simple, hyaline, ellipsoid, 10-15 x 6-7 μm .

DISTRIBUTION: Fig. 3e.

DISCUSSION:

Hue (1915a; 1915b) prepared and published two papers almost at the same time, causing a difficult nomenclatural problem. In his report (1915a) of the lichens brought back from the second French Antarctic Expedition, he published on page 52 a good description of a new species under the name *Umbilicaria rufidula*. The description was from specimens parasitised by the fungus *Scutula*, and Hue mistakenly accepted the apothecia of this *Scutula* as those of the new species. These apothecia are 0.1-0.2 mm diam., black, immarginate, hemispheric; asci 25-37 x 13-23 μm ; ascospores two-celled, hyaline, slightly pointed at each end 13-14 x 5-7 μm

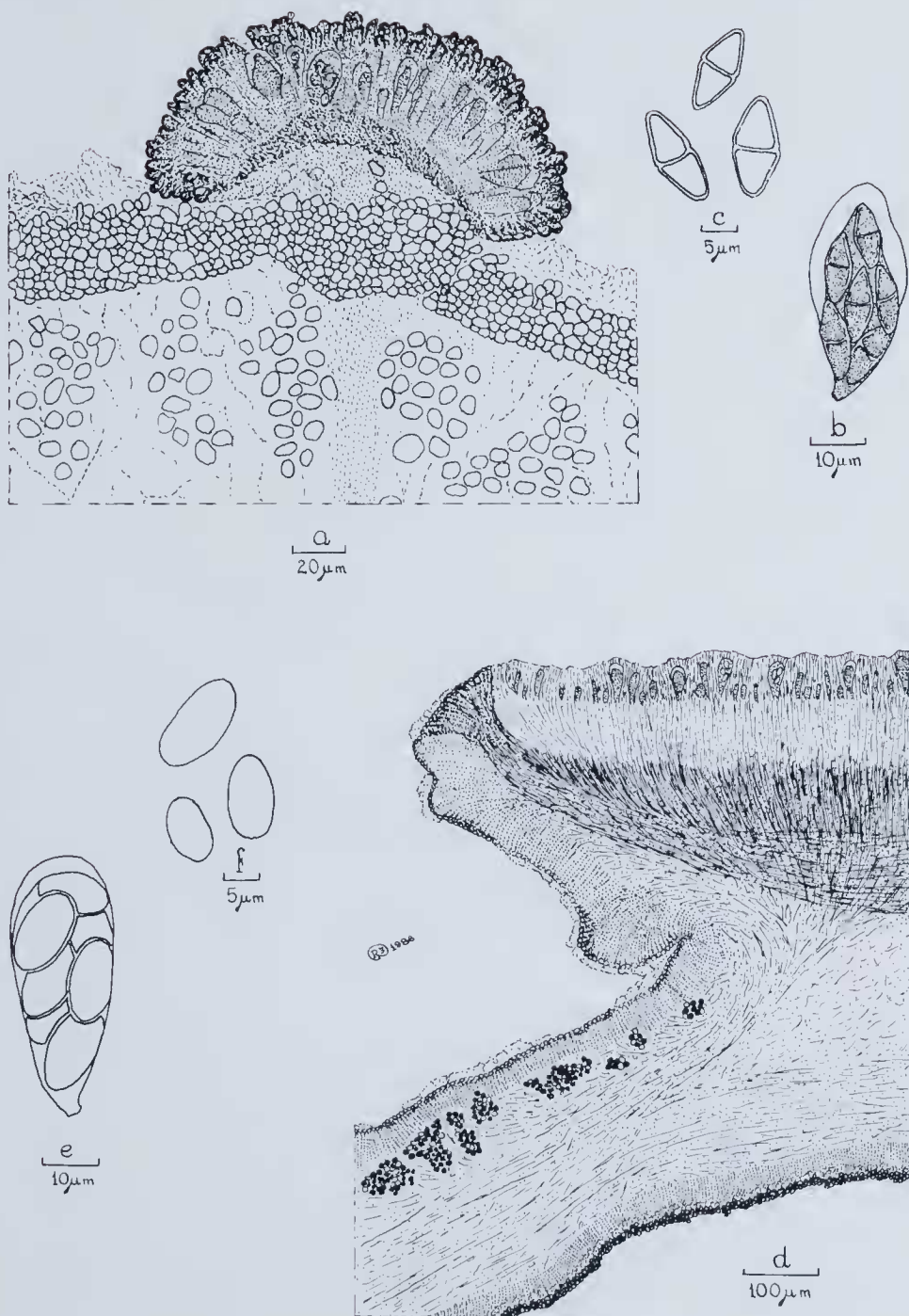


Fig. 2. a-c, *Scutula* sp., a — section through an apothecium; b — ascus; c — mature ascospores. d-f, *Umbilicaria rufidula*, d — section through an apothecium; e — a mature ascus; f — ascospores. a-c from the lectotype of *U. rufidula*; d-f from Lindsay 1190.

(Fig. 2 a-c). Subsequently he must have realised that the ascospores were not those of an *Umbilicaria* because on a later page, p. 185 of the same publication, he retained *U. rufidula* in the Umbilicariaceae but placed it in a new genus *Charcotia*, as *C. rufidula*. However in doing this, he gave no description of the new genus but merely stated “*Charcotia* Hue, *Loco citato*” “39. *Charcotia rufidula* Hue; *Umbilicaria rufidula* Hue”, the “39” being a reference back to the species number placed against *Umbilicaria rufidula* on page 52.

Charcotia cannot be considered as validly published in the above report as it lacked a generic description (article 41.1, ICBN). Whether *Umbilicaria rufidula* is validly published in the report is questionable, although an adequate description on pages 52-54 accompanied the name. If the major part of Hue’s report (including p. 52) and the final portion (including p. 185), which contained amendments to the earlier text, were published simultaneously then I believe that *Umbilicaria rufidula* Hue is not validly published as Hue himself did not accept this name in the publication (article 34.1a, ICBN). If, however, it could be shown that the report was published in parts and that p. 52 was issued before p. 185 then the name *Umbilicaria rufidula* Hue would be valid. Information given in the next paragraph indicates that text may have been typeset and proofed in stages but the printing layout of the publication supports the view that all pages of the finished publication appeared simultaneously and I have no evidence of any issue in parts.

Hue’s second paper (1915b) appeared in the Bulletin Société botanique de France. On page 17 of this he published the “Genus CHARCOTIA Hue; gen. nov.” giving a generic description and under this citing “CH. RUFIDULA Hue; *Umbilicaria rufidula* Hue, *loc. citat.*, p. 52”. There is no statement of what “*loc. citat.*” refers to, but from the page number 52 it is evident that Hue was referring to his report (1915a). He must therefore have had at least the page proofs of the report, or of portion of it, in hand at the time that he described *Charcotia* validly in the Bulletin. The citation above shows that *Charcotia rufidula* Hue was also validly published (article 32.1 c, ICBN) in this Bulletin paper.

Because the epithet *rufidula* was validly published in 1915, whether as *Charcotia* in Hue (1915b) or improbably as *Umbilicaria* in Hue (1915a), it predates all other valid epithets for this taxon and must have priority. I have therefore made a new combination to ensure that the epithet is unquestionably validated within *Umbilicaria*.

In the protologue of this species Hue placed under *U. rufidula* not only certain collections from the second expedition but also the specimens which he had incorrectly identified as *U. dillenii* Tuck. in his earlier paper (Hue 1908) enumerating the lichens of the First French Antarctic Expedition. I have therefore chosen the lectotype from the specimens collected on the First French Antarctic Expedition. The lectotype collection, from the Booth-Wandel Island in Marguerite Bay, consists of fragments of two thalli. One is large, typical, mummy-brown in colour, lightly parasitised with *Scutula*. I have chosen this thallus as lectotype. The other thallus is at a later stage of development, being pale and weathered and more fragmented and, although referable to *U. rufidula*, differs too much from the lectotype to be considered an isolectotype.

I have discussed the type specimen of *U. antarctica* elsewhere (Filson 1975b). The lectotype specimen of *U. dillenii* var. *solida* Frey consists of two small fragments. This material was retained by Frey but the rest of the specimen probably was destroyed in Berlin in 1943 (Pilger 1953). The fragments are from a typical smooth-surfaced, mummy-brown thallus. The smallest fragment is lightly perforated with a few rhizines showing through to the upper surface.

Lindsay (1969) says that “no fertile material was found in the collections. Many thalli from the South Orkney and South Shetland Islands were parasitised by a species of *Scutula*”. However Lindsay 1190 and 1282 were both abundantly fertile with apothecia of *Umbilicaria* (Fig. 2 d-f).

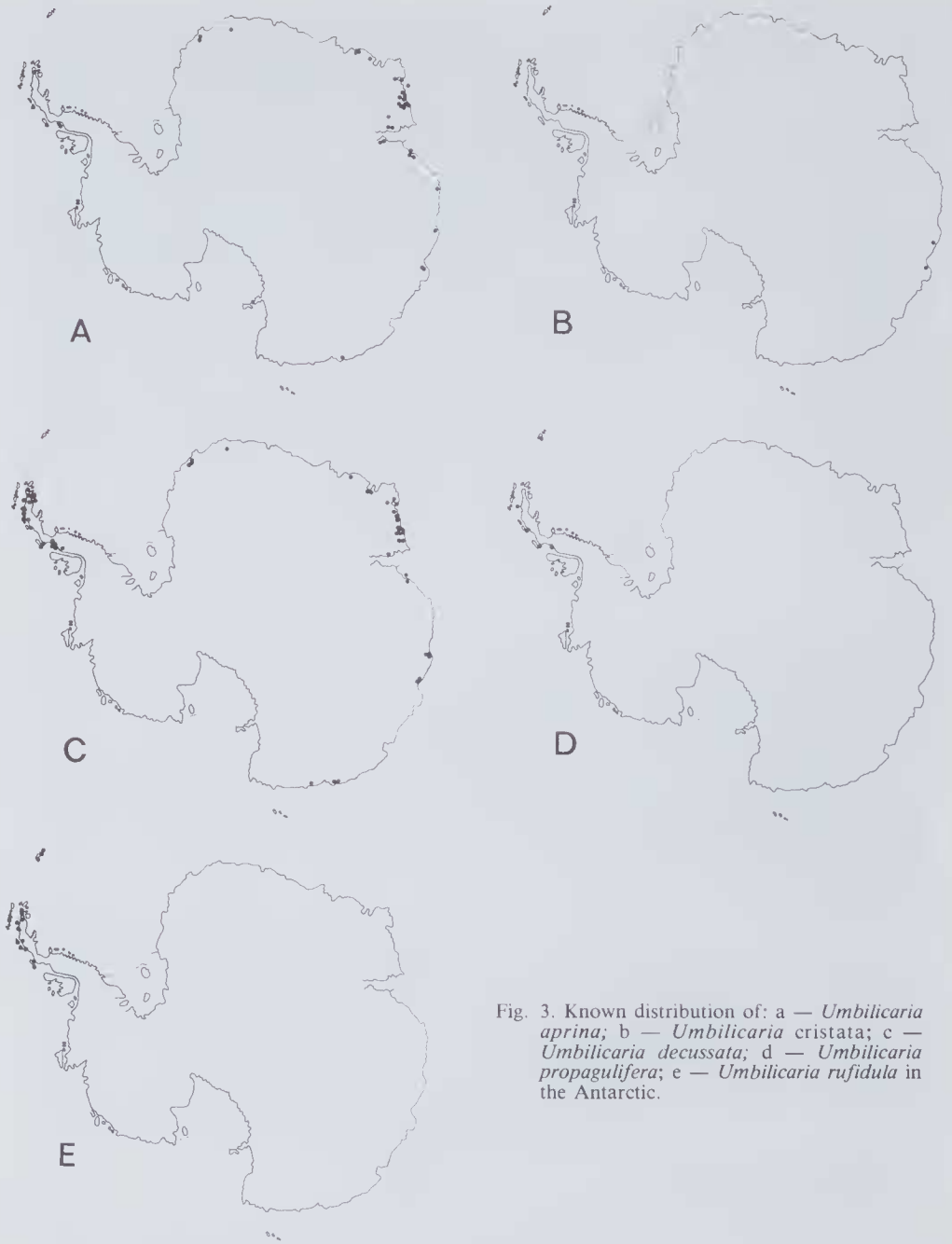


Fig. 3. Known distribution of: a — *Umbilicaria aprina*; b — *Umbilicaria cristata*; c — *Umbilicaria decussata*; d — *Umbilicaria propagulifera*; e — *Umbilicaria rufidula* in the Antarctic.

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REFERENCES

- Dodge, C. W. (1948). Lichens and lichen parasites. BANZ. Antarct. Res. Exped. 1929-1931 Rep. Ser., B. Zool.-Bot. 7: 1-276.
- Dodge, C. W. (1973). "Lichen Flora of the Antarctic Continent and Adjacent Islands." (Phoenix: New Hampshire).
- Dodge, C. W. & Baker, G. E. (1938). 11. Lichens and lichen parasites. In Siple, P.A., The botany of the Second Byrd Antarctic Expedition. *Ann. Mo. bot. Gdn.* 25: 515-727.
- Filson, R. B. (1974a). Studies in Antarctic lichens I: Notes on *Caloplaca citrina* (Hoffm.) Th. Fr. and *Physcia caesia* (Hoffm.) Hampe. *Muelleria* 3: 1-8.
- Filson, R. B. (1974b). Studies in Antarctic lichens II: the lichens from the Windmill Islands. *Muelleria* 3: 9-36.
- Filson, R. B. (1975a). Studies in Antarctic lichens III: Notes on *Rinodina olivaceobrunnea* Dodge & Baker from the Antarctic Continent and moss-inhabiting species of *Rinodina* from other parts of the world. *Muelleria* 3: 117-121.
- Filson, R. B. (1975b). Studies in Antarctic lichens IV: Notes on *Umbilicaria aprina* Nyl. *Muelleria* 3: 130-140.
- Filson, R. B. (1975c). Studies in Antarctic lichens V: Lichenes Antarctici Exsiccati, Fascicle 1, with additional notes on the taxonomy of each species. *Muelleria* 3: 146-158.
- Frey, E. (1936). Vorarbeiten zu einer Monographie der Umbilicariaceen. *Schweizerische bot. Gesell. Berichte* 45: 198-230.
- Hassenhüttl, G. & Poelt, J. (1978). Über die Brutkörner bei der Flechtengattung *Umbilicaria*. *Ber. Deutsch. Bot. Ges.* 91: 275-296.
- Henssen, A. (1970). Die Apothecienentwicklung bei *Umbilicaria* Hoffm. emend Frey. *Dtsch Bot Ges. Neue Folge* 4: 103-126.
- Hue, A. (1908). Lichens. Expédition Antarctique Française (1903-5). Sciences naturelles: Documents Scientifiques, Botanique, Paris.
- Hue, A. (1915a). Lichens. Deuxième Expédition Antarctique Française (1908-10). Sciences naturelles: Documents Scientifiques, Botanique, Paris.
- Hue, A. (1915b). Tribus Umbilicariacearum genera exposit. *Bull. Soc. bot. Fr.* ser. 4, 15: 13-23.
- Lindsay, D. C. (1969). New records for Antarctic Umbilicariaceae. *Br. Antarct. Surv. Bull.* 21: 61-69.
- Lindsay, D. C. (1972). Lichens from Vestfjella, Dronning Maud Land. *Norsk. Polarinst. Skr.* 101: 1-21.
- Llano, G. A. (1950). "A monograph of the lichen family Umbilicariaceae in the Western Hemisphere." 129 pp. (Office of Naval Research. Navexos P-831: Washington)
- Øvstedal, D. O. (1983a). Some lichens from Vestfjella, Dronning Maud Land, Antarctica. *Crypto., Bryol. Lichenol.* 4: 217-226.
- Øvstedal, D. O. (1983b). Some lichens from H.U Sverdrup Mountains, Dronning Maud Land, Antarctica. *Nova Hedwigia* 37: 683-690.
- Øvstedal, D. O. (1986). Lichens and lichen parasites from the British-Swedish-Norwegian Antarctic Expedition 1949-52 to Dronning Maud Land. *Crypto., Bryol. Lichenol.* 7: 63-70.
- Pilger, R. (1953). Bericht über den Botanischen Garten — und das Botanische Museum Berlin-Dahlen vom 1. März 1947. *Willdenowia* 1: 1-21.
- Poelt, J. (1974). Classification. Appendix A, in "The Lichens" (V. Amadjan & M.E. Hale eds.) pp. 599-632. (Academic Press: London and New York).
- Seward, M. R. D., E. A. Bylinska & P. B. Topham (1983). The distribution and ecology of *Umbilicaria propagulifera* (Vainio) Llano. *Nova Hedwigia* 38: 703-716.
- Seppelt, R. D. (1986). Lichens of the Vestfold Hills. *Antarctic Oasis* chapter 9: 247-274.
- Topham, P. B., M. R. D. Seward & E. A. Bylinska (1982). *Umbilicaria propagulifera* new to the northern hemisphere. *Lichenologist* 14: 42-52.